347 83

PROGRESS OF THEORETICAL PHYSICS

Founded by H. Yukawa in 1946 Kyoto

Advisory Council

Kōdi HUSIMI
Masao KOTANI
Takeo NAGAMIYA
Minoru KOBAYASI
Ryogo KUBO
Mituo TAKETANI

Editor

Hideki YUKAWA

Volume 66

JULY—DECEMBER

1981

Published for the

Research Institute for Fundamental Physics

and

The Physical Society of Japan

CONTENTS

No. 1 July

n the Equation of Motion of Superfluid Velocity ..... Masakazu Ichiyanagi 1

lectrical Conductivity above the Superconducting Transition Temperature in Quasi-One-Dimensional Conductors ..... Kiyomi Okamoto and Mitsunobu Wakata 15

he Perpendicular Conductivity in Quasi-One-Dimensional Superconductors ..... Mitsunobu Wakata and Kiyomi Okamoto 33

lew Aspect of Strong Electron-Phonon Coupling Superconductivity ..... Kazushige Machida 41

nomalous Relaxation in One-Dimensional Magnets. I —*Long-Time $t^{-1/2}$ Tail and Its Cutoff*— ..... Hisao Okamoto, Katsuhiko Nagano, Takashi Karasudani and Hazime Mori 53

A Thermodynamic Variational Principle in Nonlinear Non-Equilibrium Phenomena ..... Yasuji Sawada 68

Quenched System in the Spherical Limit of the Random nVector Model —*Proof of Vanishing of Mattis Spin Glass under Uniform External Field*— ..... Michiyoshi Oku 77

A New Method of Nonlinear Analysis for Threshold and Shaping Actions in Transient States ..... Masami Okuda 90

The Quantum Sine-Gordon Model and the Fermi-Bose Relation ..... Satoshi Takada and Susumu Misawa 101

The Mode-Coupling Approach to Sound Propagation in a Critical Fluid. I —*Correction Due to Hydrodynamic Interactions*— ..... Yasuhiro Shiwa and Kyozi Kawasaki 118

Adiabatic Elimination by the Eigenfunction Expansion Method ..... Kunihiko Kaneko 129

A Reductive Perturbation Approach to Hard-Mode Instabilities of Inverted-Type Bifurcations ..... Kaoru Yamafuji, Kiyoshi Toko, Junsaku Nitta and Kiichi Urahama 143

Anomalous Fluctuations near Nonequilibrium Soft Transitions. II — *Symmetry-Breaking Transitions*— ..... Kazuko T. Mashiyama and Hazime Mori 154

Magnetohydrodynamic Instabilities in a Magnetic Accretion Disk ..... Ritoku Horiuchi, Takashi Kadonaga and Akira Tomimatsu 172

Perturbations around a Slowly Rotating and Slightly Charged Black Hole ..... C. H. Lee 180

An Extended Deformation Model of ^{24}Mg. II —*Electromagnetic Properties in the $K^{\pi}=0^{\pm}$, 2^{+}, 3^{-} Bands*— ..... Hiroshi Noto 195

On the Accuracy of Wave Functions and Charge Form Factors Obtained from ATMS Calculations ..... Yoshinori Akaishi, Shuji Nakaichi and Erich W. Schmid 211

Single-Particle Spin-Orbit Splittings in Nuclei ..... Kazuhiko Andō and Hiroharu Bandō 227

A Thermal Model for Kaon Production in Relativistic Heavy-Ion Collisions ..... Fumio Asai and Mitsuo Sano 251

High Mass Photon Pair Production in Hadronic Collisions —*Continuum and Charmonium*— ..... Shigeru Hemmi 258

Diagrammatical Display of the Counter-Example to Non-Abelian Block-Nordsieck Conjecture ..... Nobuo Yoshida 269

Electric and Magnetic Gauge Symmetries in the Abelian Higgs Model ..... Zyun F. Ezawa and Aiichi Iwazaki 275

On Supergravity with Propagating Lorentz Connexion ..... Hitoshi Nishino 287

Generalized Dirac Equation with Four Orthogonal Families of Spin 1/2 Solutions ..... Ikuo Sogami 303

Gravity from Poincaré Gauge Theory of the Fundamental Particles. VI — *Scattering Amplitudes*— ..... Kenji Hayashi and Takeshi Shirafuji 318

Progress Letters:

An Entropy-Minimum Aspect of the Equivalent Linearization of a Nonlinear Stochastic Differential Equation ..... Hidemi Ito 337

Surface Roughening with Screw Dislocations ..... Takao Ohta 340

Energy-Weighted $B(E2)$ Strength for the First Excited State of Nuclei ..... Toshio Suzuki 344

Path Integral on the Coset Space of the $SO(2N)$ Group and the Time-Dependent Hartree-Bogoliubov Equation ..... Seiya Nishiyama 348

Coulomb Sum Rule Up to Three-Body Correlation Diagram in Linked Cluster Expansion ..... Michio Kohno 355
On the Bound State of $^{9}_{\Lambda}$Be Hypernucleus in the α Cluster Model ..... Yasuo Sunami and Hajime Narumi 355
Core Polarization and Exchange Current Effects on Time Component of Axial Vector Current in $A=12$ System ..... Kunio Koshigiri, Hisao Ohtsubo and Masato Morita 358
A Simple Parametrization of Semi-Inclusive Rapidity Distributions in Proton-Proton Collisions ..... Fujio Takagi 362
Determination of Parton's Transverse Momentum from High P_T Dijet Events ..... Yukio Kikuchi 366
Weak-Boson Mass from Available Neutrino Data ..... Isao Itō, Tetsushi Kimura and S. Y. Tsai 369

No. 2 August

The Effective Medium Theory of Disordered System —*A One-Dimensional Example*— ..... C. Wongtawatnugool and S. Y. Wu 373
Control and Dissipation in Oscillatory Chemical Engines ..... Peter H. Richter, Paul Rehmus and John Ross 385
The Mode-Coupling Approach to Sound Propagation in a Critical Fluid. II —*Four Heat-Mode Contribution*— ..... Yasuhiro Shiwa and Kyozi Kawasaki 406
Lattice Model of Quantum Melting. II ..... Hikaru Kawamura 421
Anomalous Relaxation in One-Dimensional Magnets. II —*Satellite Structure of EPR Line Shape*— ..... Hisao Okamoto, Takashi Karasudani, Katsuhiko Nagano and Hazime Mori 437
A Characterization of the Detailed Balance from a Viewpoint of the Onsager-Machlup Theory ..... Hidemi Ito 454
Wave Equations for Particles with Low Spin Values in the Riemannian Space of Constant Curvature ..... Izumi Furuoya 461
Linear Approximation for the Lorentz Gauge Field ..... Shikao Miyamoto, Tadao Nakano, Teruya Ohtani and Yoshinobu Tamura 481
On Quantum Theory of General-Relativistic Many-Particle Systems. II —*Friedman-Robertson-Walker Universes with Quantized Matter*— ..... Ikuo Ichinose 498
Formation of Galaxies and Clusters of Galaxies in the Neutrino Dominated Universe ..... Humitaka Sato and Fumio Takahara 508
Axially Symmetric, Stationary Gravitational Field Equations and Pseudospherical Surfaces ..... Akira Tomimatsu 526
Production of Charged Pions by High Energy Photon on Nuclei ..... Yasuhiko Futami and Jun-ichi Suzumura 534
Nuclear Saturation in the σ-Model ..... Masashi Wakamatsu 547
Short Range Part of Baryon-Baryon Interaction in a Quark Model. I —*Formulation*— ..... Makoto Oka and Koichi Yazaki 556
Short Range Part of Baryon-Baryon Interaction in a Quark Model. II —*Numerical Results for S-Wave*— ..... Makoto Oka and Koichi Yazaki 572
A QCD Analysis of Average Transverse Momentum in Jet Fragmentation ..... Katsuji Iguchi, Hisao Nakkagawa and Akira Niégawa 588
Massive Lepton Pair Production in High Energy Hadron-Hadron Scattering ..... Kiyoshi Kato 601
Decay of ψ into $\eta(\eta')\gamma$ and the Mixing of Pseudoscalar Mesons in the Quark-Gluon Model ..... Tsutomu Fujiwara and Masataka Igarashi 617
$\Delta I=1/2$ Rule in Ω Decay and the Relativistic Composite Model ..... Takashi Okazaki 635
Symmetry of New Particles ..... Seitaro Nakamura, Nobuya Nakazawa and Shigeo Sato 645
On the Baryon Number Non-Conserving Processes inside a Nucleus ..... Jiro Arafune and Osamu Miyamura 661
Covariant Schrödinger Equation via Path Integrals ..... Takashi Miura 672

ing from Non-Abelian Gauge Field ..... Shijong Ryang and Jun Ishida 685
neralized Maxwell Equations and the Gauge Mixing Mechanism of Mass Generation .....
..... Antonio Aurilia and Yasushi Takahashi 693

Progress Letters:

Deviations from Dynamic Scaling —*The Ultrasonic Attenuations in Liquid ^{4}He near the Lambda Point*— ..... Kazumasa Miyake 713
Strange Attractor (Optical Turbulence) in a Model Problem for the Laser with Saturable Absorber and the Two-Component Bénard Convection .....
..... Manuel G. Velarde and J. Carlos Antoranz 717
Critical Dynamics of Longitudinal Component in Ordered Spin System .....
..... Riichiro Shirota, Kazumasa Miyake, Masakazu Ito and Kazuo Yamada 721
Neutrino Cooling of Neutron Stars by Percolating Quarks .....
..... Masayoshi Kiguchi and Katsuhiko Sato 725
Parity Dependent Potential in Polarized Triton Scattering ..... Shigeo Ohkubo 729
Axially Symmetric Solutions to a Classical $SU(2)$ Gauge Theory ..... Jiro Sakamoto 734
Relativistic Dynamics of Classical Particle with Spin in Electromagnetic Field .....
..... Takehiko Takabayasi 736

Errata:

An Extended Deformation Model of ^{24}Mg. II — *Electromagnetic Properties in the $K^\pi=0^\pm$, 2^+, 3^- Band*— (Vol. 66, p. 195) ..... Hiroshi Noto 740
Gravity from Poincaré Gauge Theory of the Fundamental Particles. III —*Weak Field Approximation*— (Vol. 64, p. 1435) ..... Kenji Hayashi and Takeshi Shirafuji 741

No. 3 September

The Critical Temperature of the Solid Solution of $SnCl_2 \cdot (H_2O)_{2-x}(D_2O)_x$ ..... Sasuke Miyazima 743
Anomalous D.C. Current Singularities Due to Fluxon Motion with Ohmic Dissipation in Josephson Transmission Line ..... Kazuyuki Watanabe and Chikara Ishii 749
Dynamic Properties of One-Dimensional Harmonic Liquids. I — *Density Correlation and Transport Coefficients*— ..... Takeshi Yoshida, Kazuhisa Shobu and Hazime Mori 759
Crystallization of Model Neutron Matter — *Phase Diagram of a Repulsive Yukawa Potential System*— ..... Hikaru Kawamura 772
Sine-Gordon Field with Spatial Boundary Condition and Application to Josephson Junction .....
..... Hiroshi Kawamoto 780
Resolution of Velocity Autocorrelation Function of a Model Liquid .....
..... Homare Endo and Yoshikazu Endo 794
Commensurate-Incommensurate Phase Transition in Quasi One-Dimensional Electron-Phonon System —*Nearly Half-Filled Band*— ..... Hikaru Yamamoto and Tetsuo Ohmi 805
Commensurate-Incommensurate Phase Transition in a Pseudo-Harmonic Model — *Kink Lattice*— ..... Hikaru Yamamoto 813
The Kosterlitz-Thouless Transition in the Quantum Sine-Gordon Model and the Corresponding Classical Film System ..... Satoshi Takada, Toshifumi Sakaguchi and Susumu Misawa 820
One-Dimensional Many Boson System. IV —*Condensation and Excitation Energy*— .....
..... Shosuke Sasaki and Takeji Kebukawa 831
Transition Temperatures of Quasi-One-Dimensional Conductors ..... Kiyomi Okamoto 852
Collective Modes in the Quantum Lattice or Three-Dimensional XY Model. I .....
..... Toshizumi Aoki, Shigeo Homma and Huzio Nakano 861
Temporal Development of the Taylor Vortices in a Rotating Fluid. IV ..... Hideo Yahata 879
The Renormalized Energy-Momentum Tensor in a Robertson-Walker Universe .....
..... Takahiro Azuma 892
Origin of Amorphous Interstellar Grains ..... Junji Seki and Hiroichi Hasegawa 903
Coupled Channel Analysis for the Anomaly of the (^{18}O, ^{18}O*) Reaction .....
..... Atsushi Ichimura and Munetake Ichimura 913

Phenomenological Study of Three-Body Force Based on the Energy Levels of the Alpha-Particle ..... Masahiro Sato, Yoshinori Akaishi and Hajime Tanaka 930
Two-Particle System in a Force Field —*Nonsingular Integral Equations for Components of T-Operator*— ..... V. V. Komarov, Anna Popova and V. L. Shablov 940
Reaction Matrix Calculations in Neutron Matter with Alternating-Layer-Spin Structure under π^0 Condensation. I —*Formulation*— ..... Kyuichiro Tamiya and Ryozo Tamagaki 948
Particle Ratios in Hadron-Nucleus Collisions and a Collective Interaction ..... Fujio Takagi 964
Parity Nonconserving Asymmetry in p-p Scattering Up to 6 GeV/c ..... Takamitsu Oka 977
Nonleptonic Decays of Charmed Mesons under the W-Exchange Dominance Hypothesis ..... Kunihiko Terasaki 988
Elastic Scattering and Hadron Dynamics at Short Distances ..... Keiji Watanabe 1003
The Migdal Recursion Equation as a Probe for Crossover Points —*Lattice Gauge Theory on Discrete Groups*— ..... Masahiro Imachi, Sachiko Kawabe and Hiroshi Yoneyama 1025
Massless Particle with Spin $j \geq 1$ Implies the S-Matrix Symmetry ..... Taichiro Kugo and Shozo Uehara 1044
Covariance of Euclidean Fermi Fields ..... Shigeaki Nagamachi and Nobumichi Mugibayashi 1061

Progress Letters:

The Ising Model for Population Biology ..... Hirotsugu Matsuda 1078
Turbulized Rotating Chemical Waves ..... Yoshiki Kuramoto and Shinji Koga 1081
Multi-Time Expansion and Universality in One-Dimensional Difference Equation ..... Ichiro Tsuda 1086
Low Temperature Behaviors of Classical $O(3)$ Heisenberg Model in Two Dimensions ..... Yoichi Iwasaki 1089
Correlation Length of Classical $O(3)$ Heisenberg Model in Two Dimensions .. Yoichi Iwasaki 1093
Non-Markovian Langevin Equation Applied to Heavy Ion Collisions ..... Hisao Matsuzaki and Tatsuo Tsukamoto 1095
Single Particle Distribution in p-A and $\bar{p}$-A Collisions ..... Hiroyuki Sumiyoshi and Akira Minaka 1099
Phase-Shift Analysis of Proton-Proton Scattering at P_L=12 GeV/c ..... Masanori Matsuda, Hiroshi Suemitsu, Wataro Watari and Minoru Yonezawa 1102
Final-State Interactions in $K \to 2\pi$ Decays ..... J. M. A. Odongo, J. H. Reid and N. N. Trofimenkoff 1106
The $1/N$ Expansions and Quark-Junction Systems ..... Masahiro Imachi, Shoichiro Otsuki and Fumihiko Toyoda 1108

No. 4 October

Hideki Yukawa January 23, 1907—September 8, 1981 ..... Yasutaka Tanikawa 1111
Anomalous Temperature-Dependence of Magnetization in Layered System of X-Y Model ..... Masakazu Ito 1129
Phenomenological Theory of Phase Transition in Beta-Eucryptite ..... Shigetoshi Nara, Kōji Yoshimitsu and Takeo Matsubara 1143
Dynamic Properties of One-Dimensional Harmonic Liquids. II —*Energy Density Correlation and Heat Transport*— ..... Kazuhisa Shobu, Takeshi Yoshida and Hazime Mori 1160
Internal Energy, Specific Heat and Correlation Function of the Bond-Random Ising Model ..... Hidetoshi Nishimori 1169
Theory of Magnetic Superconductors with Layered Structure ..... Kazuhiko Yamashita 1182
Three-Particle Correlations in the Ground State of a Bose Fluid ..... Shuichiro Yamasaki and Masahiko Hirooka 1200
Large Cells in Nonlinear Rayleigh-Bénard Convection ..... V. L. Gertsberg and G. I. Sivashinsky 1219
Nonlinear Theory of Sound Waves near Critical Points. I —*New Dynamic Regime*— ..... Akira Onuki 1230

onnection among Equations for the Classical Heisenberg Ferromagnet, the Ernst Equation for the Axisymmetric Gravitational Field and the Yang Equations for the Self-Dual Gauge Field ..... Shozo Takeno 1250

ime-Correlation Functions of One-Dimensional Transformations ..... Hazime Mori, Byon-Chyol So and Tomoaki Ose 1266

Jonrelativistic Theory of Factorized S-Matrix ..... Kiyoshi Sogo, Mamoru Uchinami, Atsushi Nakamura and Miki Wadati 1284

Dissipation of the Primordial Terrestrial Atmosphere Due to Irradiation of the Solar Far-UV during T Tauri Stage ..... Minoru Sekiya, Chushiro Hayashi and Kiyoshi Nakazawa 1301

Quadrupole Polarizability of Nuclei Rapidly "Rotating" about the Symmetry Axis ..... Haruki Kurasawa 1317

Proton-Proton Correlations in the Statistical Model in High-Energy Heavy-Ion Reactions ..... Tetsuo Nakai and Hiroyuki Yokomi 1328

Hypernuclear Cluster Structure —*Di-"Lambpha" System*— ..... Hiroharu Bandō, Kiyomi Ikeda and Toshio Motoba 1344

Λ Single Particle Potential in Hypernuclei by an OBE Hyperon-Nucleon Interaction ..... Hiroharu Bandō 1349

Reaction Matrix Calculations in Neutron Matter with Alternating-Layer-Spin Structure under π^0 Condensation. II —*Numerical Results*— ..... Kyuichiro Tamiya and Ryozo Tamagaki 1361

Physical Meaning of the Parameter of the Degree of Coherence in the Modified Kopylov-Podgoretsky-Cocconi Formulae —*A Number of Jets versus an Adjustable Parameter*— ..... Minoru Biyajima 1378

QCD Effects to Parity-Violating $\Delta S=\Delta C=0$ Nonleptonic Interactions in the Kobayashi-Maskawa Model. II ..... Tutomu Karino, Katsuhiko Ohya and Takamitsu Oka 1389

Two-Body Decays of Nucleon and the Lifetime of Proton in Grand Unification Theories ..... Hiroaki Arisue 1395

Vacuum Structure and Chiral Charge Quantization in the Large N Limit ..... Nobuyoshi Ohta 1408

Magnetic Moments of Composite Baryons, Quarks and Leptons ..... Jonathan L. Rosner 1422

A Symmetry Breaking Pattern in the $SU(7)$ Grand Unified Model ..... Isao Umemura and Katsuji Yamamoto 1430

..... Sunao Sakai 1448

The Scaling Properties of the Confined ϕ^4 Theory ..... Restoration of Well-Defined Charge and Chiral Charge and Correct Lorentz-Transformation Property in the Thirring and Pre-Schwinger Models ..... Yuji Nakawaki 1458

New Formalism for Simple Relativistic Oscillator Model and Electromagnetic Interaction ..... Takehiko Takabayasi 1466

Spontaneous Dimensional Reduction in Generalized Kaluza's High-Dimensional Theory ..... Sho Tanaka 1477

Progress Letters:

Fluctuations in the Complex Stochastic TDGL Equation ..... Kunihiko Kaneko 1494

A Cosmological Version of Flatness Conditions in General Relativity ..... Masahiro Kihara and Hidekazu Nariai 1498

Axially Symmetric and Stationary Solutions of New General Relativity ..... Masayasu Fukui and Kenji Hayashi 1500

..... Fumihiko Hagio 1504

Primordial Black Holes and Super-Massive Star ..... WKB Derivation of Equivalent Local Potentials from RGM Non-Local Potentials of the Systems of $0s$-Shell-Nucleus+^{16}O ..... Kaoru Aoki and Hisashi Horiuchi 1508

Extended Thomas-Fermi Approach to π^0 Condensation in Neutron Matter ..... T. Ghosh, S. Bhattacharyya, A. Choudhuri and M. K. Roy 1511

Infra-Red Asymptotic Form of the Gluon Propagator in Four-Dimensional Quantum Chromodynamics ..... Kazuo Harada 1515

An Algebraic Explanation for the Family Structure of Quarks and Leptons ..... Katsusada Morita 1519

Errata:

Average Partition Function for an Electron in Frisch-Lloyd Model (Vol. 65, p. 1088) ..... Chih-Yuan Lu 1523

On Quantum Theory of General-Relativistic Many-Particle Systems. I —*Formalism*— (Vol. 65, p. 2023) ..... Ikuo Ichinose 1523

No. 5 November

On the Time Operator in Quantum Mechanics —*Three Typical Examples*— ..... Tetsuo Gotō, Katsuhito Yamaguchi and Naoshi Sudō 1525
Kinetic Equation Approach to Phase Transitions in Tunnel-Injected Superconductor. I —*Homogeneous Case*— ..... Yoshihiro Yamaguchi and Chikara Ishii 1539
The Influence of External Noise on a Marginal or a Critical Equilibrium Point ..... Yoshiyasu Hamada 1554
Ising Replicated System of $\pm J$ Model ..... Yasuhiro Kasai, Ayao Okiji and Itiro Syozi 1561
Concentration Expansion for Random Ising Systems. II ..... Tsuguhiro Tamaribuchi 1574
Flowing States and Vortices in the Classical XY Model in an External Field ..... Shigeo Homma, Toshizumi Aoki and Shozo Takeno 1590
$1/n$ Expansion for Weakly Random System with Impurity Correlation ..... Kazuhisa Yamamoto and Ryuzo Abe 1604
Gravitational Radiation of a Particle Falling towards a Black Hole. I —*The Case of Non-Rotating Black Hole*— ..... Yoshihide Tashiro and Hiroshi Ezawa 1612
On a Semi-Relativistic Treatment of the Gravitational Radiation from a Mass Thrusted into a Black Hole ..... Remo Ruffini and Misao Sasaki 1627
Basic Rotational Band and Band Mixing in the Cranking Model ..... Yoshihide Tanaka and Shota Suekane 1639
Quantum Theory of Collective Motion —*Quantized Self-Consistent Collective-Coordinate Method for the Large-Amplitude Nuclear Collective Motion*— ..... Toshio Marumori, Fumihiko Sakata, Tsutomu Une, Yukio Hashimoto and Toshihide Maskawa 1651
An Approach for the DWBA Calculation of the Two-Nucleon Transfer (p,t) Reaction ..... Naoki Hashimoto 1664
Inelastic Scattering of Pions on ^{12}C ..... Fumiharu M. Toyama, Yasuhiro Hatsuda and Yoshiyuki Sakamoto 1674
Particle Ratios under Particle Trigger in Baryon Fragmentation at Low p_T ..... Chikashi Iso 1683
Inclusive Resonance Spectra, Constituent Quark Distributions and Dual Topological Pomeron ..... Masayuki Uehara 1697
Baryon Magnetic Moments in the Quark Model and Pion Cloud Contributions ..... Toshiro Sato and Shoji Sawada 1713
Ω^- Nonleptonic Decays ..... Yasuo Hara 1729
Neutrino Mass, the Right-Handed Interaction and the Double Beta Decay. I —*Formalism*— ..... Masaru Doi, Tsuneyuki Kotani, Hiroyuki Nishiura, Kazuko Okuda and Eiichi Takasugi 1739
Neutrino Mass, the Right-Handed Interaction and the Double Beta Decay. II —*General Properties and Data Analysis*— ..... Masaru Doi, Tsuneyuki Kotani, Hiroyuki Nishiura, Kazuko Okuda and Eiichi Takasugi 1765
On the Partial Conservation of the $U(1)$ Current ..... Ken Kawarabayashi and Nobuyoshi Ohta 1789
Cancellation of the Infrared Singularity through the Unitarity Relation ..... Nobuo Yoshida 1803
Infrared Phase Factors in Quantum Electrodynamics ..... Reijiro Kubo 1816
Quantum Theory of Massive Yang-Mills Fields. I —*Basis of Formulation with Indefinite Metric*— ..... Takashi Fukuda, Minoru Monda, Minoru Takeda and Kan-ichi Yokoyama 1827
Indefinite-Metric Quantum Field Theory of General Relativity. XIV —*Sixteen-Dimensional Noether Supercurrents and General Linear Invariance*— ..... Noboru Nakanishi 1843
Euclidean Path-Integral Representation of the Vector Field. I —*The Massive Vector Case*— ..... Tarō Kashiwa 1858
A Subtraction Scheme for the Effective Potentials in the Theories with Auxiliary Fields ..... Yoshimasa Nakano 1879

Progress Letters:

Ising Ferromagnets with Random Anisotropy ..... Ikuo Tamura and Takahito Kaneyoshi 1892
Riemannian-Geometrical Interpretation of Quantum Motion of a Particle in a Dislocated Crystal ..... Hikaru Araki, Kazuo Kitahara and Kazuo Nakazato 1895
An Evidence for the Off-Shell Sensitivity through the Deuteron Wave Function in N-D Elastic Scattering ..... Yasuro Koike, Yasuto Taniguchi, Masayasu Sawada and Junpei Sanada 1899
WKB Derivation of Equivalent Local Potentials from RGM Non-Local Potentials of the Systems of 0s-Shell-Nucleus+^{4}He ..... Kaoru Aoki and Hisashi Horiuchi 1903
Coupled-Channel Study of Proton Inelastic Scattering from the Second 0^+ State in ^{12}C by Use of the 3α Resonating-Group Wave Functions ..... Tamaki Nojiri, Masayasu Kamimura, Mitsuo Sano, Masamichi Wakai and Kenji Yoro 1906
Fermion Confinement and Non-Existence of Physical Multiple Vacua in the Schwinger Model ..... Yuji Nakawaki 1910

Errata:

On the Baryon Number Non-Conserving Processes inside a Nucleus (Vol. 66, p. 661) ..... Jiro Arafune and Osamu Miyamura 1914

No. 6 December

On the Time Operator in Quantum Mechanics. II —*General Prescription in One Dimensional Case*— ..... Tetsuo Gotō, Shigefumi Naka and Katsuhito Yamaguchi 1915
The Langevin-Equation Approach to Dynamics of Dense Fluids ..... Hiroshi Ueyama 1926
Two-Dimensional Defect in Three-Dimensional Lattice —*Local Critical Exponents* η', β' *and* ν' *in the Limit* $n\to\infty$— ..... Kazuhisa Yamamoto and Ryuzo Abe 1947
Critical Amplitude Ratio ξ_0^+/ξ_0^T in $1/n$ and ε Expansions ..... Yutaka Okabe and Kazuo Ideura 1959
Spherically Symmetric Bogomolny Equation and Corresponding One-Dimensional Lattice Model ..... Takao Koikawa 1970
On the Abnormality of Period Doubling Bifurcations —*In Connection with the Bifurcation Structure in the Belousov-Zhabotinsky Reaction System*— ..... Ichiro Tsuda 1985
High-Energy Behaviour of the Particle Spectrum Created by a Linearly Expanding Universe ..... Mario Castagnino 2003
Conformal and Axial Anomalies in Riemann-Cartan Space ..... Toshiei Kimura 2011
Partially Self-Similar Solutions in General Relativity ..... Kenji Tomita 2025
General Relativistic Collapse of Rotating Supermassive Stars ..... Takashi Nakamura and Humitaka Sato 2038
Fate of Wormholes Created by First-Order Phase Transition in the Early Universe ..... Hideo Kodama, Misao Sasaki, Katsuhiko Sato and Ken-ichi Maeda 2052
Initial Behavior of a Quantized Scalar Field and the Associated Pair-Creation in Several Anisotropic Universes ..... Hidekazu Nariai 2073
Canonical Quantum Theory of Gravitational Field with Higher Derivatives ..... Shoichiro Kawasaki, Tadahiko Kimura and Koichi Kitago 2085
Shell and Alpha-Cluster-Like States in ^{44}Ti ..... Kazunori Itonaga 2103
Microscopic Cluster Model for the $^9_\Lambda$Be Hypernucleus ..... Hiroharu Bandō, Michio Seki and Yoshiyuki Shōno 2118
Boson Expansion for Many-Fermion System as a Canonical Theory with Constraints. I ..... Atsushi Kuriyama and Masatoshi Yamamura 2130
Boson Expansion for Many-Fermion System as a Canonical Theory with Constraints. II ..... Masatoshi Yamamura and Atsushi Kuriyama 2147
Collective Modes of the π^0 Condensed Phase in Pure Neutron Matter ..... M. C. Ruivo 2161
Strong CP Violation in the Chiral σ Model ..... Kazuyuki Kanaya and Makoto Kobayashi 2173
New Bound for Single and Double Diffraction Cross Sections in Identical Particle Collisions .....

.....Hiroki Kondo, Toshihide Maskawa and Akira Minaka 2184
OZI-Violating Couplings and Hadronic Production of $\eta_Q(\eta_Q')$ .....
.....Shigeo Minami and Ryozo Nakashima 2193
Hyperon Nonleptonic Decays Revisited .....Yasuo Hara and Kohki Hikosaka 2206
Variety of Solutions of 't Hooft's Metacolor .....
.....Seiichiro Takeshita, Hiromasa Komatsu, Akira Kakuto and Kenzo Inoue 2221
Hard-Photon Emission in High Energy νe Scatterings .....Ken-ichi Aoki and Zenrō Hioki 2234
On the Goldstone Theorem for the Symmetries Violated by Gauge Fixing .....Taichiro Kugo 2249
Gravity from Poincaré Gauge Theory of the Fundamental Particles. VII —*The Axial-Vector Model*— .....Kenji Hayashi and Takeshi Shirafuji 2258

Progress Letters:

Brownian Motion of a Quantum Spin with Friction .....N. Gisin 2274
Critical Point of Two-Layered Potts Model Coupled with Four-Body Interaction.....
.....Yoshio Matsuda 2276
Periodic Stationarity of a Chaotic Motion in the System Governed by Duffing's Equation ..
.....Hisanao Ogura, Yoshisuke Ueda and Yasuo Yoshida 2280
A Structural Consideration on the Brans-Dicke Scalar $\phi(x)$ .....Satoshi Ikeda 2284
Production of Magnetized Black Holes and Wormholes by First-Order Phase Transition in the Early Universe .....Katsuhiko Sato 2287
Fire-Ball Analysis of High Energy Cosmic Ray Interactions ..R. Hasan and M. S. Swami 2291
A Four-Δ Bound State .....Tamotsu Ueda 2296
K^+N Single Energy Partial Wave Analysis for $I=1$ and 0 States .....Keiji Hashimoto 2300
A New Estimation of Quark Masses Based on a Non-Relativistic Quark Model .....
.....Shoji Takeshita 2304
Pion-Nucleon Coupling Constant in the $1/N$ Expansion.....
.....Akira Kakuto and Fumihiko Toyoda 2307

Author Index to Volume 66.....2311
Subject Index to Volume 66.....2320
Contents to Volume 66 i